1 OF 1
PB
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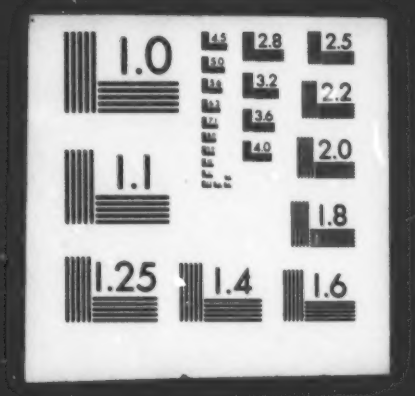

PB-240 313

BANTAM LAKE, LITCHFIELD COUNTY, CONNECTICUT

Pacific Northwest Environmental Research Laboratory

Prepared for:

National Environmental Research Center
Connecticut Department of Environmental Protection
Connecticut National Guard

January 1975

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT
ON
BANTAM LAKE
LITCHFIELD COUNTY
CONNECTICUT

EPA REGION I

WORKING PAPER No. 177

WITH THE COOPERATION OF THE

CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

AND THE

CONNECTICUT NATIONAL GUARD

JANUARY, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Connecticut Department of Environmental Protection for professional involvement and to the Connecticut National Guard for conducting the tributary sampling phase of the Survey.

John J. Curry, Director of the former Water Resources Commission; Roy B. Anderson, Principal Sanitary Engineer, and Steven Gerdsmeier, Sanitary Engineer, of the Water Compliance Unit, Department of Environmental Protection; and Sam Suffern, Assistant Director of Water and Related Resources, Department of Environmental Protection, provided invaluable lake documentation and counsel during the course of the Survey.

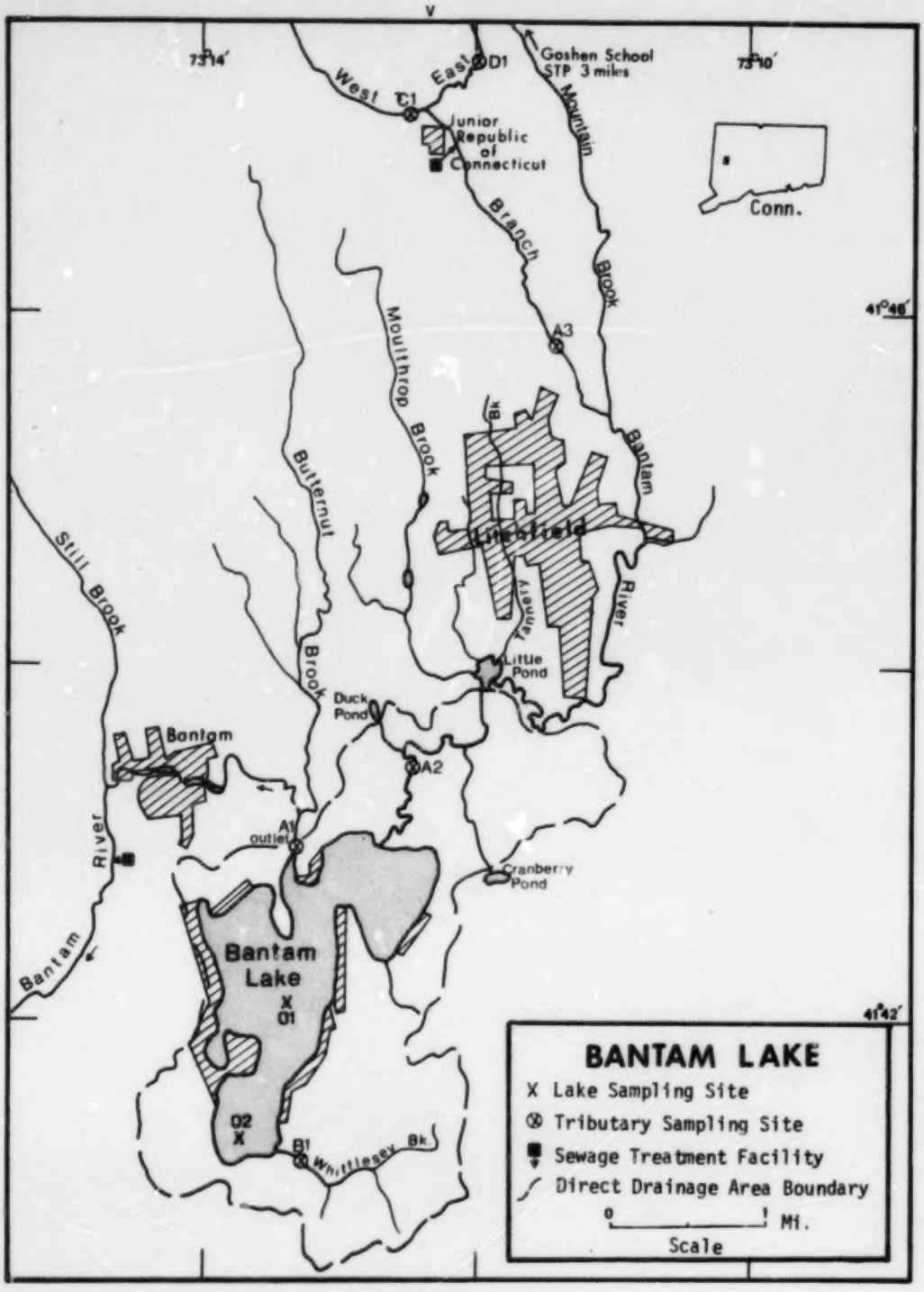
Major General John F. Freund, the Adjutant General of Connecticut, and Project Officer Lieutenant Colonel Daniel M. McGuire, who directed the volunteer efforts of the Connecticut National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF CONNECTICUT

LAKE NAME	COUNTY
Aspinook Pond	New London, Windham
Bantam	Litchfield
Community	New Haven
Eagleville	Tolland
Hanover Pond	New Haven
Housatonic Impoundments:	
Housatonic	Fairfield, New Haven
Lillinonah	Fairfield, Litchfield, New Haven
Zoar	Fairfield, New Haven


73°14'
73°10'
41°48'
41°42'
West
East
D1
C1
Goshen School
STP 3 miles
Junior
Republic
of
Connecticut
Mountain
Branch
Brook
Conn.
A3
Moulthrop Brook
Butternut
Brook
Still Brook
Bantam
River
Litchfield
Avenue
Little
Pond
Duck
Pond
A2
Bantam
A1
outlet
Cranberry
Pond
Bantam
Lake
01
02
B1
Whittlesey Bk.
BANTAM LAKE
X Lake Sampling Site
Tributary Sampling Site
Sewage Treatment Facility
Direct Drainage Area Boundary
0
1 Mi.
Scale

BANTAM LAKE

STORET NO. 0902

I. CONCLUSIONS

A. Trophic Condition:

Bantam Lake is eutrophic. Algal blooms are frequent, and growths of rooted emergent aquatic vegetation are heavy. Anaerobic conditions were present during summer stratification.

B. Rate-Limiting Nutrient:

The algal assay results show that nitrogen was the limiting nutrient at the time the fall sample was collected. The lake data indicate nitrogen limitation at the other sampling times as well.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Bantam Lake received a total phosphorus load at a rate less than that proposed by Vollenweider (in press) as "dangerous" but more than his "permissible" rate; i.e., a mesotrophic rate (see page 15). It is calculated that the two point sources included in this study contributed only 8% of the total load, and it is concluded that phosphorus control at these sources would not significantly improve the trophic condition of the lake.

Note that nutrient "wash-out" occurred during the sampling year; that is, more nutrients were measured leaving the lake

than were measured entering the lake (see pages 13 and 14). The wash-out may have been due only to insufficient sampling or to unknown and unmeasured nutrient sources discharging directly to the lake (e.g., shoreline septic tanks). However, if nutrient wash-out actually occurred, the most likely cause would be the elimination of a nutrient source prior to the beginning of the Survey.

Now, for many years, the old Litchfield wastewater treatment plant effluent was discharged to groundwater via a series of filter (seepage) beds which were located near the Bantam River a short distance above Bantam Lake. In November, 1971, the old plant was replaced by a new plant which discharges to the Bantam River below the lake; Survey tributary and waste treatment plant sampling began in August of 1972.

In an earlier study, Frink (1967) concluded that the old Litchfield waste treatment plant did not impact Bantam Lake since samples of the Bantam River above and below the plant site did not reveal significant differences in nutrient concentrations. However, he did not assess the impact of the treatment plant on the level of nutrients in the groundwater or groundwater contribution of nutrients to the lake, although he noted that the upper centimeter of the lake bottom sediments contained at least 10 times his estimated annual input of nitrogen

and phosphorus (sedimentation was estimated at 0.4 centimeters per year; i.e., the upper centimeter would have been deposited in 2½ years, indicating that on an annual basis, about 4 times more nitrogen and phosphorus were sedimented than could be accounted for by his estimated annual inputs).

In view of the proximity of the old plant to the Bantam River, the nutrient wash-out noted above, and the existing mesotrophic loading rate, it seems likely that the effluent from the old Litchfield plant did, in fact, impact Bantam Lake during the operational period of the plant. If this was the case, the trophic condition of Bantam Lake should improve once a new nutrient equilibrium is established. However, rooted aquatic vegetation is likely to continue to be a problem for some time because of the alternate source of nutrients from the sediments.

2. Non-point sources (see page 14)--The phosphorus export of the Bantam River appears to have been somewhat high during the sampling year but was less than the watershed export of 146 $lbs/mi^2/yr$ estimated by Frink (op. cit.). The phosphorus export, in part, may have been due to continuing contributions from the previous groundwater discharge of the old Litchfield wastewater treatment plant.

II. INTRODUCTION

Bantam Lake is a relatively shallow natural lake located in the townships of Litchfield and Morris in northwestern Connecticut. The lake is separated into North Bay, South Bay, and a larger central portion connecting the two. The natural lake level has been raised by a low dam in the village of Bantam. Although the inlet and outlet are both located in the northern portion of the lake, extensive mixing with the rest of the lake has been reported (Frink, 1967).

The watershed is largely composed of forested, agricultural, and abandoned agricultural lands. This rural watershed has a population of approximately 10,000 people. The shoreline is largely developed; and cottages are numerous.

Lake use is largely recreational. Bantam Lake is considered an above-average fishery for white perch, yellow perch, and largemouth bass (Anonymous, 1959).

Deep deposits of highly organic sediments have accumulated over many years; the heavy growths of algae and submerged and emergent aquatic vegetation likely are contributing to the ooze accumulation.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry†:

1. Surface area: 916 acres.
2. Mean depth: 14.3 feet.
3. Maximum depth: 25 feet.
4. Volume: 13,099 acre-feet.
5. Mean hydraulic retention time: 112 days.

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area*	Mean flow*
Bantam River	27.8 mi^2	48.9 cfs
Minor tributaries & immediate drainage -	4.0 mi^2	9.8 cfs
Totals	31.8 mi^2	58.7 cfs

2. Outlet -

Bantam River	33.2 mi^2**	58.7 cfs

C. Precipitation***:

1. Year of sampling: 60.6 inches.
2. Mean annual: 44.8 inches.

---

† Anonymous, 1972.

* Drainage areas are accurate within ±1%; gaged mean daily and mean monthly flows are accurate within ±10%; ungaged mean daily and mean monthly flows are accurate within ±20%; and normalized mean monthly flows are accurate within ±10% for gaged streams and within ±12% (high flow) to 27% (low flow) for ungaged streams.

** Includes area of lake.

*** See Working Paper No. 1, "Survey Methods".

IV. LAKE WATER QUALITY SUMMARY

By means of a pontoon-equipped Huey helicopter, Bantam Lake was sampled three times at station 1 and two times at station 2 during the open-water season of 1972. Each time, samples for physical and chemical parameters were collected from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (15 feet or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 21 feet at station 1 and 10 feet at station 2.

The results obtained are presented in full in Appendix B, and the data for the fall sampling period, when the lake essentially was well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

Parameter	Minimum	Mean	Median	Maximum
		FALL VALUES (10/04/72)		
Temperature (Cent.)	16.1	16.4	16.4	16.7
Dissolved oxygen (mg/l)	7.9	8.8	8.8	9.6
Conductivity (µmhos)	120	120	120	120
pH (units)	7.9	8.4	8.5	8.8
Alkalinity (mg/l)	30	32	33	33
Total P (mg/l)	0.044	0.052	0.048	0.067
Dissolved P (mg/l)	0.017	0.018	0.017	0.019
NO_2 + NO_3 (mg/l)	0.030	0.030	0.030	0.030
Ammonia (mg/l)	0.040	0.055	0.055	0.070
		ALL VALUES		
Secchi disc (inches)	36	65	45	132

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
05/23/72	1. Asterionella	1,092
	2. Dinobryon	1,019
	3. Fragilaria	195
	4. Anabaena	72
	5. Melosira	29
	Other genera	124
	Total	2,531
08/01/72	1. Oscillatoria	4,789
	2. Dinobryon	1,235
	3. Schroederia	602
	4. Gloeocapsa	392
	5. Chroococcus	331
	Other genera	1,326
	Total	8,675
10/04/72	1. Coelosphaerium	3,825
	2. Flagellates	210
	3. Polycystis	180
	4. Synedra	136
	5. Melosira	120
	Other genera	499
	Total	4,970

2. Chlorophyll a -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll a (µg/l)
05/29/72	01	9.5
08/01/72	01	37.3
	02	8.2
10/04/72	01	53.0
	02	47.9

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.034	0.031	4.2
0.006 P	0.040	0.031	4.3
0.012 P	0.046	0.031	5.5
0.024 P	0.058	0.031	3.6
0.060 P	0.094	0.031	4.2
0.060 P + 10.0 N	0.094	10.031	43.2
10.0 N	0.034	10.031	13.4

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Bantam Lake was moderately high in October, 1972, when the sample was collected. Also, the lack of growth response to increased levels of orthophosphorus, until nitrogen was also added, indicates the lake was nitrogen limited at that time. Note the increase in yield when only nitrogen was added.

The lake data indicate nitrogen limitation at the other sampling times as well; i.e., N/P ratios were about 6/1, and nitrogen limitation would be expected.

D. Trophic Condition:

Bantam Lake is eutrophic. Survey limnologists noted algal blooms in progress in August and October of 1972, and dissolved oxygen was depleted in the hypolimnion in August. Rooted aquatic weeds cover about 25% of the lake area (Ketelle and Uttormark, 1971).

Bantam Lake has been cited by Frink (1967) as a classic example of natural eutrophication, but Survey data indicate possible point-source influence.

IV. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Connecticut National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high run-off month of March when two samples were collected. Sampling was begun in August, 1972, and was completed in September, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Connecticut District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the mean annual concentrations in Whittlesey Brook at station B-1 and the mean annual ZZ flow.

The operator of the Connecticut Junior Republic Association wastewater treatment plant provided monthly effluent samples and corresponding flow data. However, the Goshen School treatment plant was not sampled; and, because of similarity of flow and treatment type, the nutrient loads were estimated to be the same as the CT Junior Republic loads.

---

* See Working Paper No. 1.

The nutrient loads attributed to the Bantam River are those measured at station A-2 minus the measured and estimated point-source loads.

For many years, the old Litchfield municipal waste treatment plant discharged effluent to ground waters near the Bamtam River upstream from Bantam Lake; this plant was abandoned in late 1971, prior to the beginning of the Survey, but may have impacted the lake during the sampling year (see page 2).

A. Waste Sources:

1. Known muncipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
CT Junior Republic Assoc.*	100	sand filter	0.010	W. Br., Bantam River
Goshen School**	-	sand filter	0.012	Mountain Brook

2. Known industrial - None

* Reynolds, 1973.
** Gerdsmeier, 1974.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Bantam River	3,110	60.7
b. Minor tributaries & immediate drainage (non-point load) -	1,450	28.4
c. Known municipal -		
CT Junior Republic	210	4.1
Goshen School	210	4.1
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	140	2.7
Total	5,120	100.0

2. Outputs -

Lake outlet - Bantam River 5,360

3. Net annual P loss - 240 pounds

* See Working Paper No. 1.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/yr	% of total
a. Tributaries (non-point load) -		
Bantam River	68,580	69.0
b. Minor tributaries & immediate drainage (non-point load) -	20,860	21.0
c. Known municipal -		
CT Junior Republic	590	0.6
Goshen School	590	0.6
d. Septic tanks - Unknown	-	-
e. Known industrial - None	-	-
f. Direct precipitation* -	8,820	8.8
Total	99,440	100.0

2. Outputs -

Lake outlet - Bantam River 105,680

3. Net annual N loss - 6,240 pounds

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs $P/mi^2/yr$	lbs $N/mi^2/yr$
Bantam River	112	2,467

* See Working Paper No. 1.

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (in press). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with very short detention times.

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	5.6	loss*	108.6	loss*
grams/m^2/yr	0.63	-	12.2	-

Vollenweider loading rates for phosphorus ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Bantam Lake:

"Dangerous" (eutrophic rate)	1.20
"Permissible" (oligotrophic rate)	0.60

* See page 2.

V. LITERATURE REVIEWED

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VII. APPENDICES

APPENDIX A

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR CONNECTICUT 11/26/74

LAKE CODE 0902 BANTAM LAKE

TOTAL DRAINAGE AREA OF LAKE 33.20

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
0902A1	33.20	71.00	75.00	124.00	117.00	69.00	31.20	19.80	23.90	23.40	38.10	56.00	65.00	58.67
0902A2	27.80	59.00	62.00	103.00	98.00	58.00	26.00	17.00	20.00	20.00	25.00	46.00	54.00	48.91
0902ZZ	5.40	12.00	13.00	21.00	19.00	11.00	5.20	2.80	3.90	3.40	5.10	10.00	11.00	9.76

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 33.20 TOTAL FLOW IN = 705.40
SUM OF SUB-DRAINAGE AREAS = 33.20 TOTAL FLOW OUT = 705.40

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
0902A1	8	72	20.00	19	16.00				
	9	72	9.40	16	12.00				
	10	72	19.00	14	14.00				
	11	72	88.00						
	12	72	126.00	26	101.00				
	1	73	104.00						
	2	73	98.00	21	54.00				
	3	73	96.00	17	118.00	30	76.00		
	4	73	100.00	23	92.00				
	5	73	54.00	10	51.00				
	6	73	39.00	21	37.00				
	7	73	72.00	18	32.00				
	8	73	17.00	15	13.00				
	9	73	13.00	12	7.50				
	10	73	13.00						
0902A2	8	72	17.00	19	13.00				
	9	72	8.00	16	9.90				
	10	72	16.00	14	12.00				
	11	72	74.00						
	12	72	124.00	26	99.00				
	1	73	97.00						
	2	73	96.00	21	53.00				
	3	73	94.00	17	116.00	30	75.00		
	4	73	98.00	23	51.00				
	5	73	53.00	10	50.10				
	6	73	38.00	21	36.00				
	7	73	60.00	18	27.00				
	8	73	14.00	15	11.00				
	9	73	11.00	12	6.30				
	10	73	11.00						

TRIBUTARY FLOW INFORMATION FOR CONNECTICUT 11/26/74

LAKE CODE 0902 BANTAM LAKE

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
090222	8	72	3.30	19	2.50				
	9	72	1.40	16	1.70				
	10	72	3.30	14	2.40				
	11	72	14.00						
	12	72	2.50	26	2.00				
	1	73	17.00						
	2	73	1.90	21	1.00				
	3	73	1.80	17	2.30	30	1.50		
	4	73	2.00	23	1.00				
	5	73	1.00	10	1.00				
	6	73	0.70	21	0.70				
	7	73	12.00	18	5.20				
	8	73	2.70	15	2.10				
	9	73	2.10	12	1.20				
	10	73	2.10						

APPENDIX B

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 74/11/26

090201
41 42 00.0 073 13 30.0
BANTAN LAKE
09 CONNECTICUT

11EPALES 2111202
4 0024 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/05/29	19 30	0000	18.0	9.2	132	110	6.90	24	0.020	0.020	0.043	0.010
	19 30	0009	15.3	6.6		260	6.60	24	0.040	0.040	0.024	0.011
72/08/01	11 30	0000			51	110	7.00	32	0.070	0.130	0.030	0.010
	11 30	0004	23.4	7.0		100	6.80	32	0.060	0.110	0.030	0.009
	11 30	0010	22.9	5.8		105	6.80	32	0.050	0.120	0.032	0.011
	11 30	0015	19.5	0.0		110	6.50	36	0.040	0.370	0.168	0.127
	11 30	0021	18.1	0.0		110	6.40	38	0.070	0.830	0.479	0.199
72/10/04	12 40	0000			36	120	8.45	32	0.030	0.060	0.055	0.010
	12 40	0004	16.7	7.9		120	8.00	33	0.030	0.050	0.047	0.010
	12 40	0015	16.5	8.6		120	7.95	33	0.030	0.040	0.049	0.017

21<

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/05/29	19 30	0000	9.5J
72/08/01	11 30	0000	37.3J
72/10/04	12 40	0000	53.0J

J VALUE KNOWN TO BE IN ERROR

STORET RETRIEVAL DATE 74/11/26

090202
41 41 44.0 073 13 45.0
BANTAM LAKE
09 CONNECTICUT

11EPALES 2111202
3 0014 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/08/01	12 00	0000				105	7.00	35	0.060	0.130	0.037	0.009
	12 00	0004	23.2	7.2		105	6.90	34	0.060	0.120	0.037	0.011
	12 00	0010	22.9	6.2		105	6.80	33	0.060	0.140	0.045	0.010
72/10/04	12 25	0000			39	120	8.75	33	0.030	0.050	0.048	0.017
	12 25	0004	16.2	9.6		120	8.65	31	0.030	0.070	0.044	0.017
	12 25	0008	16.1	9.0		120	8.60	30	0.030	0.060	0.067	0.019

22A

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/08/01	12 00	0000	8.2J
72/10/04	12 25	0000	47.9J

J VALUE KNOWN TO BE IN ERROR

APPENDIX C

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 74/11/26

0902A1 LS0902A1
41 43 00.0 073 13 30.0
BANTAM RIVER
09011 7.5 LITCHFIELD
O/BANTAM LAKE
NORTH SHORE RD BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/08/19	11 30		0.050	1.100	0.120	0.016	0.048
72/09/16	11 35		0.052	1.100	0.048	0.016	0.082
72/10/14	10 30		0.060	0.950	0.092	0.013	0.077
72/11/11	09 05		0.055	0.575	0.060	0.012	0.024
72/12/26	14 20		0.360	0.340	0.044	0.007	0.020
73/02/21	14 25		0.180	0.370	0.018	0.005K	0.030
73/03/17	10 15		0.220	0.360	0.027	0.011	0.020
73/03/30	11 00		0.150	0.520	0.007	0.005K	0.030
73/04/23	16 08		0.014	0.220	0.012	0.005K	0.025
73/06/21	10 10		0.013	2.900	0.084	0.012	0.030
73/07/18	11 25		0.056	1.200	0.082	0.026	0.075
73/08/15	10 30		0.094	0.480	0.072	0.025	0.080
73/09/12	13 15		0.100	0.660	0.032	0.027	0.090

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

0902A2 LS0902A2
41 43 30.0 073 12 30.0
BANTAM RIVER
09 7.5 LITCHFIELD
I/BANTAM LAKE
WEBSTER RD BRDG
11EPALES 2111204
4 0000 FEET DEPTH

25A

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/08/19	11 10		0.089	0.700	0.092	0.021	0.040
72/09/16	11 40		0.096	0.700	0.116	0.015	0.036
72/10/14	10 20		0.140	0.550	0.110	0.012	0.032
72/11/11	10 00		0.034	0.500	0.042	0.008	0.025
72/12/26	11 05		0.357	0.290	0.038	0.007	0.016
73/02/21	14 15		0.360	0.750	0.056	0.008	0.020
73/03/17	09 25		0.210	0.520	0.026	0.007	0.020
73/03/30	10 45		0.189	0.640	0.029	0.007	0.030
73/04/23	16 20		0.054	0.440	0.027	0.009	0.035
73/05/10	10 00		0.100	0.820	0.067	0.011	0.035
73/06/21	10 00		0.098	2.500	0.180	0.028	0.065
73/07/18	11 15		0.054	0.800	0.110	0.030	0.060
73/08/15	10 15		0.052	0.460	0.072	0.017	0.055
73/09/12	13 00		0.075	0.600	0.063	0.023	0.060

STORET RETRIEVAL DATE 74/11/26

0902A3 LS0902A3
41 45 50.0 073 11 28.0
BANTAM RIVER
09 7.5 W TORRINGTON
I/BANTAM LAKE
NORFOLK RD BRDG BELO JR REPUB OF CT STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	10 55		0.107	0.450	[illegible]060	0.014	0.043
72/10/14	09 55		0.130	0.500	[illegible].069	0.013	0.035
72/11/11	09 10		0.036	0.400	[illegible].034	0.008	0.026
72/12/26	10 30		0.357	0.720	[illegible].063	0.015	0.029
73/02/21	14 00		0.260	0.300	0.048	0.007	0.030
73/03/17	08 25		0.210	0.560	0.036	0.006	0.020
73/03/30	10 25		0.115	0.390	0.054	0.027	0.045
73/04/23	15 50		0.130	1.980	0.100	0.026	0.060
73/05/10			0.080	0.870	0.052	0.027	0.040
73/06/21	09 35		0.160	0.580	0.054	0.048	0.095
73/07/18			0.077	0.540	0.056	0.039	0.070
73/08/15	10 45		0.082	0.960	0.058	0.024	0.085
73/09/12	13 30		0.099	0.635	0.029	0.026	0.080

STORET RETRIEVAL DATE 74/11/26

090281 LS090281
41 41 00.0 073 13 30.0
WHITTLESEY BROOK
09 7.5 LITCHFIELD
T/BANTAM LAKE
EAST SHORE RD BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/09/16	11 10		0.520	0.500	0.061	0.009	0.042
72/10/14	10 10		0.530	0.600	0.100	0.015	0.036
72/11/11	08 30		0.039	0.775	0.034	0.006	0.025
73/02/21	14 40		1.020	0.560	0.056	0.006	0.075
73/03/17	06 50		0.220	0.400	0.024	0.005	0.020
73/03/30	10 40		0.770	0.260	0.015	0.005K	0.020
73/04/23	16 30		0.530	0.890	0.040	0.009	0.025
73/06/21	09 50		0.850	0.460	0.031	0.016	0.040
73/07/18	11 05		0.480	0.400	0.042	0.016	0.030
73/08/15	11 15		0.660	1.200	0.069	0.022	0.260
73/09/12	14 00		0.690	1.400	0.063	0.023	0.250

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/26

0902C1 LS0902C1
41 47 00.0 073 12 30.0
W BRANCH BANTAM RIVER
09 7.5 W TORRINGTON
T/BANTAM LAKE
ST HWY 63 BRDG ABOVE STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/08/19	09 40		0.104	0.925	0.054	0.027	0.039
72/09/16	10 35		0.138	0.500	0.062	0.020	0.048
72/10/14	09 40		0.042	0.550	0.066	0.010	0.027
72/11/11	08 25		0.039	0.450	0.046	0.007	0.026
72/12/26	10 20		0.340	0.390	0.018	0.006	0.010
73/02/21	12 35		0.252	2.000	0.110	0.030	0.065
73/03/17	07 30		0.210	0.540	0.031	0.012	0.020
73/03/30	10 15		0.088		0.060	0.013	0.015
73/04/23	15 45		0.130	1.300	0.083	0.021	0.060
73/05/10	09 22		0.018	0.760	0.042	0.008	0.023
73/05/10			0.058	0.460	0.031	0.016	0.040
73/06/21	09 20		0.230	0.950	0.042	0.039	0.060
73/07/18	10 40		0.066	0.540	0.032	0.030	0.050
73/08/15	11 00		0.126	0.560	0.024	0.031	0.070
73/09/12	13 45		0.147	0.710	0.019	0.034	0.075

28

STORET RETRIEVAL DATE 74/11/26

090201 LS090201
41 47 30.0 073 12 00.0
E BRANCH BANTAM RIVER
09 7.5 W TORRINGTON
T/BANTAM LAKE
DEMING RD BRDG ABOVE STP
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/08/19			0.420	0.200	0.042	0.019	0.019
72/09/16	10 45		0.410	0.200	0.048	0.008	0.024
72/10/14	09 45		0.380	0.400	0.056	0.007	0.011
72/11/11	08 50		0.042	0.755	0.066	0.008	0.023
72/12/26	10 25		0.690	0.170	0.016	0.010	0.012
73/02/21	13 45		0.850	0.115	0.014	0.005K	0.020
73/03/17	07 55		0.336	0.400	0.042	0.010	0.040
73/03/30	10 20		0.600	0.100K	0.009	0.005K	0.010
73/04/23	15 40		0.350	0.170	0.018	0.005K	0.010
73/05/10			0.340	0.340	0.015	0.006	0.015
73/06/21	09 25		0.160	1.000	0.147	0.014	0.035
73/07/18	10 45		0.270	0.700	0.027	0.008	0.075
73/08/15	11 30		0.110	0.460	0.097	0.005K	0.045
73/09/12	14 15		0.126	0.970	0.099	0.007	0.050

29

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 74/11/27

0090250 AS090250 P003500*
41 47 00.0 073 12 30.0
CT JUNIOR REPUBLIC
09 7.5 W TORRINGTON
T/BATAM LAKE
BANTAM RIVER
11EPALES 2141264
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/01/31	11 00								
CP(T)-			3.400	19.000	9.950	7.380	7.380	0.000	0.010
73/01/31	16 00								
73/02/28	11 00								
CP(T)-			2.100	24.000	15.200	3.000	4.200	0.000	0.010
73/02/28	16 00								
73/03/30	11 00								
CP(T)-			0.070	18.000	9.100	11.000	14.000	0.000	0.010
73/03/30	16 00								
73/04/30	11 00								
CP(T)-			42.500	3.600	0.057	4.400	4.700	0.000	0.010
73/04/30	16 00								
73/05/31	11 00								
CP(T)-			2.100	6.100	0.670	10.000	11.000	0.010	0.010
73/05/31	16 00								
73/06/30	11 00								
CP(T)-			1.900	6.900	1.000	10.000	11.500	0.000	0.010
73/06/30	16 00								
73/07/31	11 00								
CP(T)-			9.200	3.700	1.260	0.940	4.400	0.000	0.010
73/07/31	16 00								
73/09/01	11 00								
CP(T)-				2.000		3.220	3.400	0.010	0.010
73/09/01	16 00								
73/09/29	11 00								
CP(T)-			15.400	0.800	0.510	7.737	8.096	0.006	0.006
73/09/29	16 00								
73/11/01	11 00								
CP(T)-			3.800	14.000	2.400	5.600	6.200	0.010	0.006
73/11/01	16 00								
73/12/11	11 00								
CP(T)-			3.360	17.500	6.325	8.250	9.000	0.010	0.000
73/12/11	16 00								
74/01/16	11 00								
CP(T)-			0.720	24.000	9.500	7.200	8.300	0.000	0.010
74/01/16	16 00								

STORET RETRIEVAL DATE 74/11/27

090250 AS090250 P003500*
41 47 00.0 073 12 30.0
CT JUNIOR REPUBLIC
09 7.5 W TORRINGTON
T/BATAM LAKE
BANTAM RIVER
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/02/06	11 00								
CP(T)- 74/02/06	16 00		4.800	20.000	8.500	3.400	3.900	8.000	10.000

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